SB761
U757
#83-6

United States
Department of
Agriculture
**Forest
Service**
Southwestern
Region

Forest Pest Management Report

R-3 83-6

BIOLOGICAL EVALUATION
Spruce Beetle

Fort Apache Indian Reservation
Arizona

January 1983

LIBRARY
FEB 23 1983
ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

3430

R-3 83-6

BIOLOGICAL EVALUATION
Spruce Beetle

Fort Apache Indian Reservation
Arizona

January 1983

USDA Forest Service, Southwestern Region
State and Private Forestry
Forest Pest Management
517 Gold Avenue, SW
Albuquerque, New Mexico 87102

PREPARED BY:

James P. Linnane

JAMES P. LINNANE, Supervisory Entomologist
Forest Pest Management

APPROVED BY:

Douglas L. Parker

DOUGLAS L. PARKER
Director of Forest Pest Management

ABSTRACT

The spruce beetle continues to cause spruce mortality over an extensive area of the Fort Apache Indian Reservation. This current outbreak was initially detected in 1981. The 1982 survey, conducted by Forest Pest Management and Bureau of Indian Affairs personnel, utilized a stratified sampling design based on aerial sketch-map estimates of fading spruce. Survey results estimated a mean of 2.6 trees per acre attacked by spruce beetle in 1982. The survey area contained approximately 23,204 acres of spruce-fir forest type. The estimated volume loss to date may be as high as 97.0 to 122.7 MMBF. Beetle populations are expected to remain high during 1983.

Management alternatives and recommendation are discussed in this report.

INTRODUCTION

Extensive spruce beetle infestations were initially detected in the spring of 1981 on the Fort Apache Indian Reservation. In the fall of 1981, a biological evaluation, performed by Forest Pest Management (FPM), indicated spruce beetle populations were at or near outbreak levels (Ragenovich 1982). This evaluation indicated significant spruce mortality had occurred and predicted continued outbreak-level beetle populations. At the request of the Bureau of Indian Affairs (BIA), and with their cooperation, a second extensive spruce beetle evaluation was undertaken in 1982.

The intent of the evaluation was to (1) estimate the numbers of currently and previously infested trees, (2) determine volume loss, and (3) predict the infestation trend. Ground surveys conducted by FPM and BIA personnel began September 7, 1982, and were completed by September 16, 1982. This report presents the survey results, lists practical alternatives, and presents management recommendations.

TECHNICAL INFORMATION

Insect. Spruce beetle, Dendroctonus rufipennis (Kirby)

Host. Engelmann spruce, Picea engelmannii Parry

Life History and Evidence of Infestation. Schmid and Frye (1977) and Massey and Wygant (1954) describe the spruce beetle life cycle and behavior in detail. Briefly, Dendroctonus rufipennis has predominantly a 2-year life cycle, although 1-year and 3-year life cycles have been described. Adult D. rufipennis usually attack their hosts during May, June, and possibly early July. Egg gallery construction and oviposition continue through the summer. Immature larvae are present by October and overwinter. Larvae resume feeding in spring and develop to pupae sometime before late summer. Pupae transform to adults which overwinter a second time. These insects emerge in the late spring to attack new host material.

Spruce beetles generally prefer to attack green windthrown or other recently downed spruce. As a result, endemic beetle populations are always present, breeding in scattered down material, in the spruce-fir forest type. Outbreaks generally begin after a major forest disturbance (i.e., a large windthrow) creates an abundance of suitable breeding material. Beetle populations rapidly increase in the down material and then readily attack standing spruce. Outbreaks may persist until suitable host material is depleted. On occasion, unfavorable climatic conditions, principally extreme cold, cause outbreaks to collapse.

Spruce beetle outbreaks are difficult to detect. Tree crowns fade approximately 1 year after attack; however, discolored needles may remain on twigs for only a short duration, making recently attacked

trees difficult to separate from snags. Newly attacked trees can often only be detected by close examination for boring dust. Pitch tubes may or may not be readily visible.

History of Spruce Beetle on the Fort Apache Indian Reservation. Ragenovich (1982) summarized the history of spruce beetle on the Fort Apache Indian Reservation as follows: "Large areas of spruce mortality were first detected in the White Mountains of the Fort Apache Indian Reservation in 1904. This mortality was most likely the result of spruce beetle activity. The first recorded spruce beetle outbreak occurred from 1948 to 1952, when an estimated 22 percent of the spruce was killed in the Ord Creek drainage. The next recorded outbreak occurred from 1968 to 1971 when beetle populations built up in down material and spread to standing green trees, killing tens of thousands of trees in five drainages. The outbreak subsided abruptly in 1971 when record-low temperatures caused high larval mortality."

Location and Extent of the Current Infestation. Increased spruce mortality was first detected in 1981. Subsequently, spruce faders have been detected throughout the spruce-fir type on reservation lands including the Mount Baldy Wilderness Area (figure 1). An aerial detection survey conducted in July 1982 estimated over 100,000 fading spruce, up substantially from the 1981 survey. Spruce faders were particularly concentrated in the Tiger Butte to Burnt Mountain area.

Host Stand Condition. The spruce beetle is currently active in mature spruce-fir stands, with an average spruce diameter over 18 inches d.b.h. and basal areas from 170 to 200 feet per acre. Salvage logging was initiated in 1981 and continues to date. Standing infested and dead spruce are abundant in many areas as well as down spruce from the current and past spruce beetle outbreaks.

A biological evaluation conducted in 1981 (Ragenovich 1982) estimated newly beetle-attacked spruce ranged from 1.6 to 10.2 trees per acre within a sample area of 4,000 acres. The evaluation concluded significant spruce mortality would continue and the infestation had been in existence for several years. It was surmised that stand disturbances, such as logging residues, blowdown, and road construction, provided an opportunity for increased beetle populations.

METHODS

Survey Design. A systematic variable plot cruise following a stratified random sampling design was used to estimate tree losses and beetle activity in five managment compartments. Sampling intensity was determined using population variance estimates from the 1981 evaluation and a stratification of currently fading spruce based on an aerial sketch map. The sketch map provided the approximate locations and intensities of 1981 spruce beetle attacks. From this information, spruce beetle activity was delineated into three strata; low (estimate <1 fader per acre), moderate (estimate <3 faders per acre), and heavy (estimate >3 faders per acre). Table 1 presents the compartment sizes by strata.

The number of samples needed to achieve a 20-percent standard error, with a probability of 95 percent, was estimated using the following formula:

$$n = 4\ C.V.^2/S.E.$$

Where: n = number of samples
C.V. = coefficient of variation
S.E. = desired standard error

Table 2 presents the estimated number of samples needed by compartment and strata. These estimates were considered the base line for sampling intensity. If time and manpower allowed, sampling intensity would be increased. Samples were partitioned proportional to strata size in each compartment.

Cruise lines were located in the cardinal directions across contour at 20-chain intervals over the entire spruce-fir forest type in each compartment. Variable point sample plots were located along cruise lines at 5- or 10-chain intervals, depending on required sampling intensity for the various strata. Variable point sampling was accomplished using a 30 BAF prism.

Data Collection. All sample trees were tallied by species and diameter. Spruce was classed in one of five damage categories based on beetle activity: (1) green--uninfested spruce; (2) 1982 attacks--parent adults, eggs, or small larvae present; (3) 1981 attacks--fading foliage and large larvae, pupae, or adults present; (4) old attacks--no spruce beetle present and foliage mostly dropped; (5) partial attack--beetle attacks limited to one side of bole and foliage green.

Data Anaylsis. Data were compiled and analyzed using the "PEST" program at Fort Collins Computer Center. This program provides the average trees per acre and basal area per acre by damage categories with standard deviation and standard error estimates. Volume estimates for live and infested trees by damage category were made using the basal area estimates and local V-bar tables.

Estimates of strata means and standard errors were computed using the statistical methods described by Freese (1962).

Observations. In addition to the variable plot cruise of management compartments, observations were made on spruce beetle brood conditions and beetle activity in Mount Baldy Wilderness Area.

RESULTS

Sampling Intensity. A systematic variable plot cruise was accomplished on an estimated 23,204 acres of spruce-fir forest type. A total of 772 sample plots were measured in the 3 strata. Stratum 1 (low) contained 162 plots; stratum 2 (moderate) contained 365 plots; and stratum 3 (high) contained 245 plots. The numbers of sample plots

in each compartment were as follows: (1) Bull Cienega--220 plots, (2) Burnt Mountain--80 plots, (3) Diamond Butte--121 plots, (4) Mount Ord--295 plots, and (5) Sunrise--56 plots.

Complications with the computer program "PEST" required 15 plots be dropped from stratum 2 in the analysis.

Tree Losses. Tree losses compiled by damage class are presented in table 3. Current attacked (1982) spruce ranged from a low of 2.0 trees per acre (stratum 1) to a high of 3.5 trees per acres (stratum 2). The mean for all strata was 2.6 trees per acre. Previous attacked (1981) spruce ranged from a low of 0.8 trees per acre (stratum 1) to a high of 2.9 trees per acre (stratum 2). The mean for all strata was 1.7 trees per acre. The total spruce attacked, including partial attacks, ranged from a low of 18.6 trees per acre (stratum 1) to a high of 21.5 trees per acres (stratum 2). The mean for total spruce attacked was 19.4 trees per acre. Corresponding basal area estimates are also in table 3.

To date, the spruce beetle has attacked (including partial attacks) the following percentage of spruce basal area: (1) Stratum 1 (low)--17.4 percent, (2) stratum 2 (moderate)--19.9 percent, and (3) stratum 3 (high)--29.8 percent.

Gross Volume Losses. Table 4 presents gross volume estimates by species/ damage class by stratum. Total gross volume estimates for all species range from a low of 24.5 MBF per acre in stratum 3 to a high of 26.9 MBF per acre in stratum 2. The average volume per acre for all strata is 25.4 MBF. Volume losses to spruce beetle (including partial attacks) range from 4.1 MBF per acre in stratum 1 to 6.76 MBF per acre in stratum 3. The average loss is 5.6 MBF per acre.

Table 5 persents gross volume estimates for the five management compartments. The volume by compartment of spruce attacked in 1982 (current attacks) ranged from 2.2 MMBF (Sunrise) to 5.5 MMBF (Mount Ord). The volume estimates for 1981 attacks (pervious attacks) range from 2.7 MMBF (Sunrise) to 6.7 MMBF (Mount Ord).

If the volume estimates for each compartment are summed, the estimate for total attacked spruce, with a 95 percent confidence limit, falls between 114.1 and 144.3 MMBF. This estimate is based on the gross acreage surveyed (23,204 acres). This is a rough approximation because the acreage estimate includes clearcuts, roads, and other nonforested acres. However, even reducing the estimate by 15 percent, the volume attacked still ranges from 97.0 to 122.7 MMBF.

Stand Structure and Composition. Tables 6 to 17 present stand table information for spruce beetle host and nonhost trees by stratum. The stratum 1 (low) basal area estimate is 192 square feet per acre, with 71 percent being spruce. Corkbark fir, Douglas-fir, and aspen account for 11, 13, and 5 percent of the basal area, respectively.

Stratum 2 (moderate) has a basal area estimate of 193 square feet per acre for all species. Spruce accounts for 88 percent of this estimate. Corkbark fir, Douglas-fir, and aspen comprise 6, 4, and 2 percent of the basal area, respectively.

The stratum 3 (low) basal area estimate is 167 square feet per acre for all species. Thirty percent is spruce. Corkbark fir, Douglas-fir, and aspen comprise 17, 8, and 5 percent of the basal area, respectively.

Table 18 presents the average diameters for spruce by stratum and damage class. The weighted averages for all strata are: Green spruce--15.9 inches, current attacks--18.4 inches, previous attacks--24.4 inches, old attacks--20.2 inches, and partial attacks--19.4 inches.

Observations in the Mount Baldy Wilderness Area. An effort was made to investigate spruce beetle activity in the wilderness area, Reservation Creek, and Thompson Creek. These areas were not cruised. However, aerial sretch maps, combined with ground observations, provided some information.

Numerous 1981 and 1982 attacks are visible in the wilderness area, particularly in the northwest end. Large diameter spruce snags are also numerous as a result of past outbreaks. The Reservation Creek drainage is similar in appearance.

The Thompson Creek drainage shows evidence of recent spruce beetle activity. However, the average spruce diameter appears much smaller than the other areas examined.

DISCUSSION

Survey results indicate substantial spruce mortality has occurred as a result of the current beetle outbreak. Beetle populations remain high as evidenced by the frequency of current attacks (2.6 trees per acre). The current and previous year's attack frequencies indicate the spruce beetle will continue to cause significant spruce mortality during at least the next 2 years, barring extreme weather.

Figures 2, 3, and 4 illustrate the basal area for live and beetle-infested spruce for each stratum. These histograms graphically describe basal area losses in various diameter classes. Basal area losses are greater in the larger diameter classes, as expected. Basal area reduction and associated volume losses in the spruce component will continue to increase as the beetle outbreak proceeds. The end result may be reductions in total stand basal areas to less than 120 square feet per acre, with the depletion of a high percentage of large diameter spruce. The percent basal area in nonhost tree species will increase.

The trend in average spruce diameter (table 18) attacked by the beetle follows the theory that large diameter trees are preferred and more susceptible to attack. As the outbreak continues, the average diameter of newly attacked and green trees will decline.

The volume loss estimates are cumulative; that is, the estimates include spruce killed by the beetle over the last few years. While volume losses will continue to increase, the annual additional loss may only be 5 to 10 MMBF.

Observations in the Mount Baldy Wilderness Area were brief and no data were taken. However, there is no reason to believe the spruce beetle situation is much different than in the compartments surveyed. Spruce beetle damage should be comparable to what has been described and beetle activity should continue in the wilderness area.

During the survey, the various spruce beetle life stages were observed and examined. No unusual mortality was noticed.

The stratified random sampling design provided estimates with fair precision (standard errors). Although no statistical test was performed between strata, it is doubtful a significant statistical difference exists between strata 2 and 3. The basis of the stratification was the density of fading spruce. This fact may have biased the total stand volume estimates and any estimates concerning nonhost tree species.

ALTERNATIVES

The following alternatives are provided for consideration:

1. No Action. This alternative allows the spruce beetle infestation to continue, regulated only by natural factors. Tree losses caused by the infestation are assumed acceptable.

2. Direct Suppression of the Infestation. Under this alternative, direct action will be taken to suppress the infestation. Individual infested trees are either: (a) Treated with an insecticide, (b) felled and burned, or (c) felled and debarked. To be effective, a high percentage (>90 percent) of infested trees must be located and treated. In large infestations, this is a difficult to nearly an impossible task.

3. Salvage Logging. This alternative involves logging of highly vulnerable, infested, and dead trees. Large diameter uninfested trees, along with infested and dead material, are felled and transported to millsites. The intent is to maximize utilization while reducing stand vulnerability. Salvage logging may slow an infestation, but it will not suppress or appreciably change the course of the infestation.

4. Presalvage Logging. This alternative is a variant of salvage logging designed to utilize trees susceptible to damage. Presalvage involves cutting merchantable trees in anticipation of losses that are likely to occur before definitive regeneration cuts are made to replace the stands (Smith 1962). Under this alternative, stands would be entered and susceptible spruce, principally large diameter, would be removed prior to attack by the spruce beetle. The principal advantage of presalvage over salvage is the market value of the material removed. Green, unifested spruce should have a higher dollar value than dead, infested spruce subjected to spiral checking and other degrades. Again, presalvage logging may slow an infestation and reduce dollar losses, but it will not suppress or appreciably change the course of an infestation.

5. Use Trap Trees. Under this alternative, uninfested merchantable trees are felled prior to beetle flight. These trees are more attractive to beetles than standing trees and, hence, lure beetles away from standing timber. To be effective, trap trees must be felled in accessible areas to simplify removal. Thus, they must be removed or treated prior to the next beetle flight. Unfortunately, we do not know the number of traps trees required for adequate control or where they should be felled. While the trap-tree approach may be effective on infestations of limited size, it is doubtful any benefit could be derived when used against extensive infestations.

A variation of trap trees is lethal trap trees. Prior to felling, these trees are injected with silvicides. Brood development in these trees is unsuccessful. Lethal trap trees do not necessarily have to be removed.

6. Preventive Insecticidal Spray. The insecticide carbaryl when applied to the bole of suitable bark beetle host trees has prevented successful attack by these insects. The preventive spray strategy is successfully used against mountain pine beetle and certain Ips beetles on ponderosa and lodgepole pines. However, little information is available on its effectiveness against the spruce beetle.

RECOMMENDATIONS

The direct suppression, trap-tree, and preventive insecticidal spray alternatives, in general, are not recommended. Direct suppression and trap-tree alternatives are considered ineffective against large, active infestations, such as the current infestation on the reservation. The preventive spray alternative requires further investigation and development to ascertain its effectiveness.

The recommended approach to the current spruce beetle outbreak is a combination of the no action, salvage logging, and presalvage logging alternatives. The basis for selecting which alternative, or mix of alternatives, is appropriate for individual compartments or stands should be based on such considerations as management objectives, market situations, accessibility, windfirmness, slope, and regeneration requirements. For instance, salvage logging may be appropiate in stands with good accessibility, slopes <30 percent, no windfirm problems, and high spruce mortality. Presalvage logging may be appropiate in stands with large volumes of susceptible trees and little current spruce beetle mortality. No action may be appropiate in reserved areas, stands with poor access, or on steep slopes. In designing salvage and presalvage cuts, windfirmness and regeneration requirements should be important considerations.

Logging operations should be closely monitored to insure that a minimun of logging debris remains. Stump height should be kept below 1.5 feet. Cull logs and tops should be bucked into short lengths and scattered in open areas. Log decks should be removed to millsites prior to beetle flight.

Long-Term Management Considerations. Some general guidelines are available for possible inclusion in management plans. Schmid and Frye (1976) describe high-risk stands as those located on good sites, having an average diameter of live spruce greater than 16 inches d.b.h., more than 150 square feet per acre basal area, and a species composition of 65 percent spruce or more. Possible long-term guidelines should avoid the creation of a substantial number of stands with the preceding characteristics. Basal area regulation may be the best approach to avoid high-risk stands. These guidelines may also apply when entering previously unmanaged, old-growth stands. It may be preferable to initially remove large diameter spruce when reducing basal area. Also, periodic inspections of logged areas should be planned to detect recent blowdown. If measurable blowdown occurs, salvage should be undertaken.

LITERATURE CITED

Freese, F. 1962. Elementary forest sampling. USDA Forest Serv., Southern Forest Exp. Sta. Handbook No. 232. 91 pp.

Massey, C. L., and N. D. Wygant. 1954. Biology and control of the Englemann spruce beetle in Colorado. U.S. Dep. Agric. Circ. No. 944. 35 pp.

Ragenovich, Iral. 1982. Biological evaluation, spruce beetle, Fort Apache Indian Reservation, Arizona. USDA Forest Serv., Southwestern Reg. R-3 82-6. 22 pp.

Smith, D. M. 1962. The practice of silviculture. John Wiley and Sons, Inc. N.Y. 578 pp.

Schmid, J. M., and R. H. Frye. 1976. Stand ratings for spruce beetle. USDA Forest Serv. Res. Note RM-309. 4 pp.

Schmid, J. M., and R. H. Frye. 1977. Spruce beetle in the Rockies. UDSA Forest Ser. Gen. Tech. Rep. RM-49. 38 pp.

1982
SPRUCE BEETLE INVENTORY
FORT APACHE AGENCY
SCALE 1:24000
MT ORD
BULL CIENEGA
SUNRISE
DIAMOND BUTTE
BURNT MTN.
LEGEND
BOUNDARY OF INVENTORY AREA
TIMBER SALE BOUNDARY
AREAS STRATIFIED BY INSECT INFESTATION
ROADS
INFESTATION LEVEL
H HEAVY
M MODERATE
L LIGHT

FIGURE 1

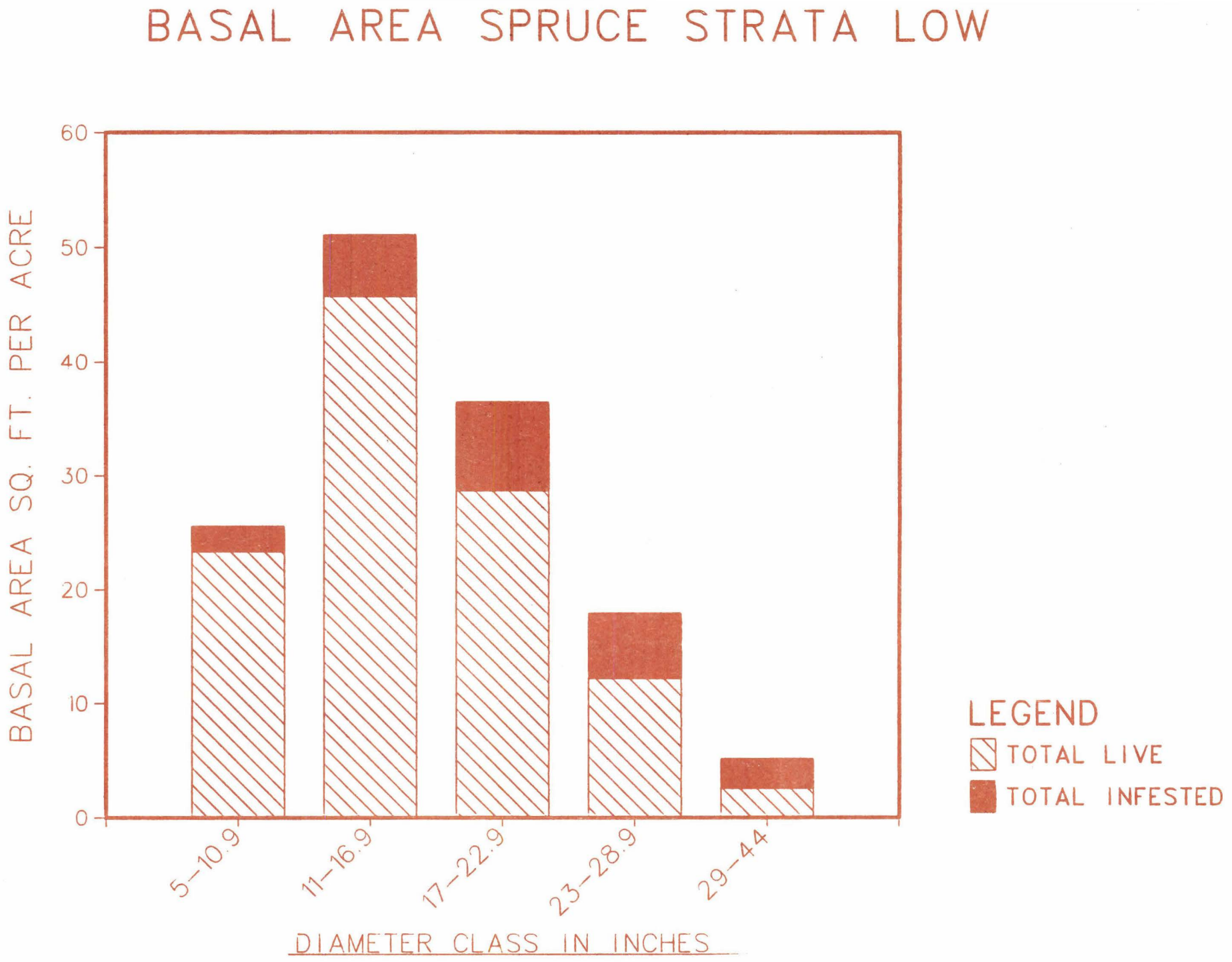

FIGURE 2.--Basal area of live and beetle-infested spruce by diameter classes for the low stratum, Fort Apache Indian Reservation, 1982

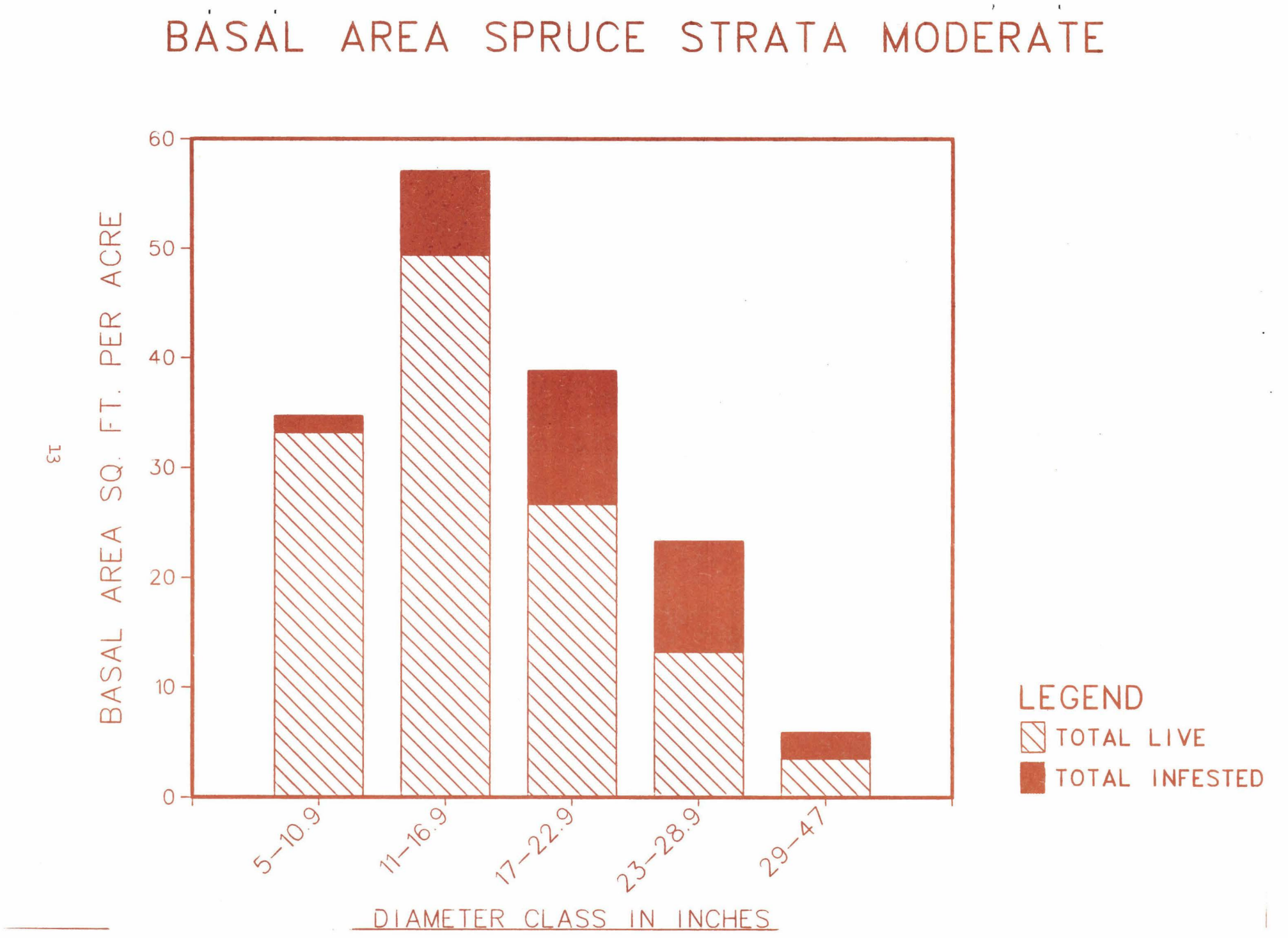

FIGURE 3.--Basal area of live and beetle-infested spruce by diameter classes for the moderate stratum, Fort Apache Indian Reservation, 1982

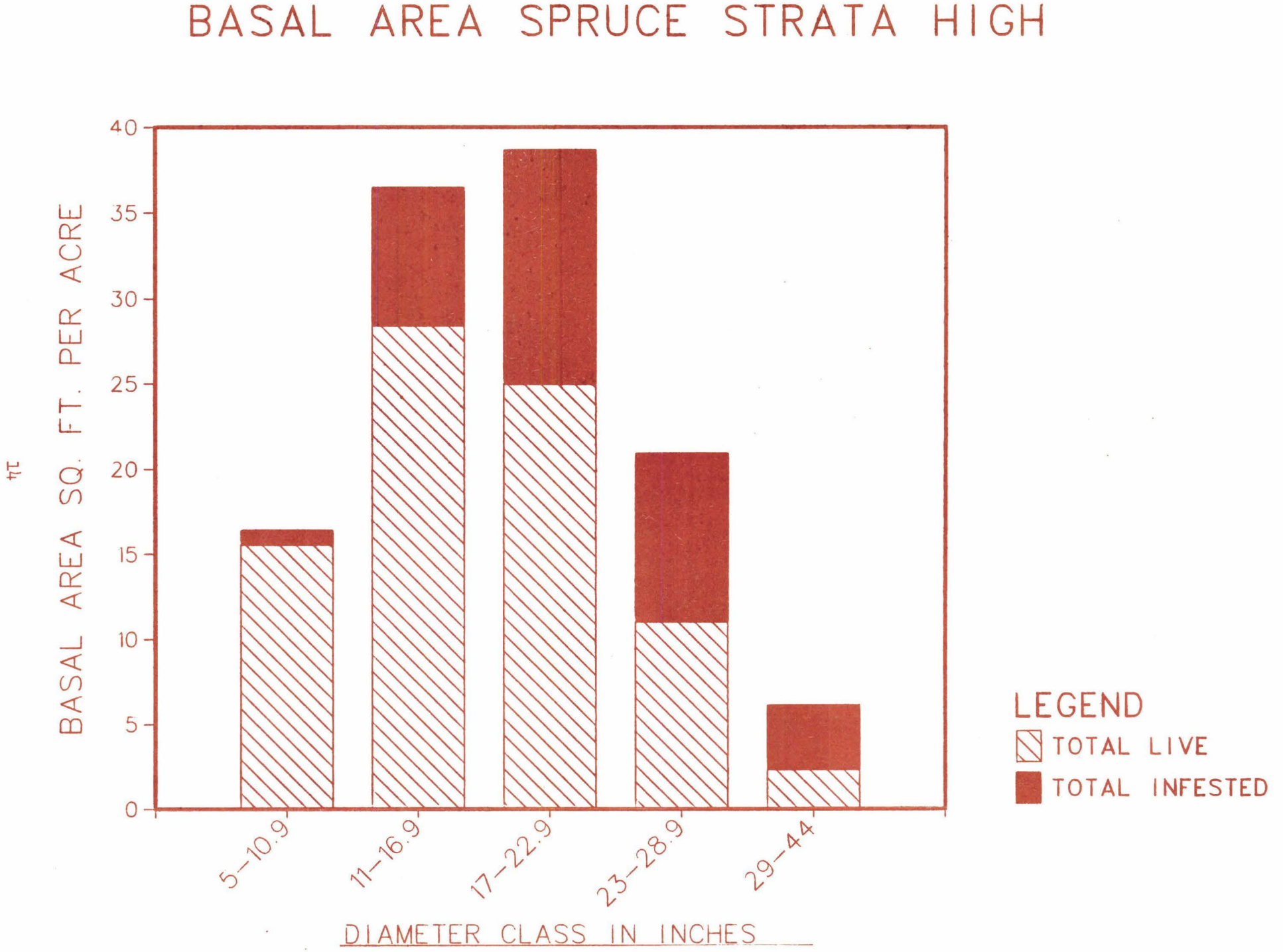

FIGURE 4.--Basal area of live infested spruce by diameter classes for the high stratum, Fort Apache Indian Reservation, 1982

TABLE 1.--Survey compartments size stratified by infestation level. Strata delineated from low-aerial sketch maps

Compartment	Infestation strata (acres)			
	Low	Moderate	Heavy	Totals
Bull Cienega	2,379	2,526	0	4,905
Burnt Mountain	1,644	18	2,085	3,747
Diamond Butte	657	110	2,980	3,747
Mount Ord	2,227	1,102	4,418	7,747
Sunrise	3,058	0	0	3,058
Total	9,965	3,756	9,483	23,204

TABLE 2.--The estimated number of plots required to acheive a 20 percent S.E. with a probability of 95 percent by strata. Plots per stratum partitioned proportional to stratum size

Compartment	Strata		
	Low	Moderate	Heavy
Bull Cienega	12	171	0
Burnt Moutain	9	2	34
Diamond Butte	4	7	48
Mount Ord	12	72	72
Sunrise	16	0	0
Total	53	252	154

TABLE 3.--Basal area and trees per acre by species/damage class for the sampling strata, Fort Apache Indian Reservation

Species/damage class	Stratum 1 low		Stratum 2 mod.		Stratum 3 high		Mean	
	B.A. (S.E.)	T/A (S.E.)	B.A. (S.E.)	T/A (S.E.)	B.A. (S.E.)	T/A (S.E.)	B.A. (S.E.)	T/A (S.E.)
Green spruce	112.6 (5.9)	143.1 (10.3)	136.7 (4.3)	174.1 (8.5)	82.6 (4.3)	91.9 (6.9)	104.2 (3.1)	127.2 (4.5)
Current attacks (1982)	2.8 (0.9)	2.0 (0.7)	5.3 (0.9)	3.5 (0.7)	4.6 (0.9)	2.8 (0.6)	3.9 (0.5)	2.6 (0.4)
Previous attacks (1981)	2.2 (0.7)	0.8 (0.3)	6.5 (1.2)	2.9 (0.5)	5.4 (1.3)	2.2 (0.5)	4.2 (0.6)	1.7 (0.3)
Old attacks	17.2 (2.5)	14.9 (2.9)	17.6 (1.6)	12.3 (1.4)	20.4 (1.9)	12.0 (1.6)	18.6 (1.3)	13.3 (1.4)
Partial attacks	1.5 (0.6)	0.9 (0.4)	4.5 (0.7)	2.5 (0.5)	4.6 (1.1)	2.6 (0.6)	3.2 (0.5)	1.8 (0.3)
Total spruce attacked	23.7 (2.9)	18.6 (3.1)	33.9 (2.6)	21.2 (1.8)	35.0 (3.1)	19.6 (2.1)	30.0 (1.8)	19.4 (1.6)
Corkbark fir	21.3 (2.6)	41.6 (6.1)	11.2 (1.4)	24.2 (2.4)	27.9 (2.4)	52.9 (5.5)	22.4 (1.5)	43.4 (3.6)
Douglas-fir	25.0 (4.1)	20.0 (5.3)	6.9 (1.8)	5.1 (1.5)	12.7 (2.5)	6.3 (1.3)	17.0 (2.0)	12.0 (2.3)
Aspen	9.1 (2.0)	18.7 (6.1)	4.0 (1.3)	7.0 (3.7)	7.8 (1.8)	11.2 (2.5)	7.7 (1.1)	13.7 (2.8)
Other species	0.6 (0.3)	0.4 (0.2)	0	0	0.7 (0.3)	0.6 (0.3)	0.5 (0.2)	0.4 (0.2)
Total		242 (15.6)		231.6 (13.6)		182.5 (9.6)		

TABLE 4.--Gross volume estimates by species/damage class for sampling strata, Fort Apache Indian Reservation

Species/damage class	Gross volume (MBF/acre Scribner)			
	Stratum 1 Low	Stratum 2 Moderate	Stratum 3 High	Mean
Green spruce	15.34	18.26	12.14	14.51
Current attacks (1982)	0.47	0.95	0.85	0.71
Previous attacks (1981)	0.47	1.32	1.12	0.87
Old attacks	2.94	3.17	3.92	3.38
Partial attacks	0.27	0.85	0.88	0.61
Total spruce attacked	4.15	6.30	6.76	5.56
Total spruce	19.49	24.55	18.91	20.07
Corkbark fir	1.97	0.99	2.70	2.11
Douglas-fir	3.16	0.87	1.72	2.20
Aspen	0.98	0.47	1.14	0.96
Other species	0.06	0	0.06	0.05
Total nonhost	6.17	2.33	5.62	5.32
Grand total	25.66	26.88	24.53	25.40

TABLE 5.--Total spruce volume estimates for management compartments, Fort Apache Indian Reservation

Damage class	Total gross volume[1] (MMBF Scribner)									
	Bull Cienega		Burnt Mountain		Diamond Butte		Mount Ord		Sunrise	
	Vol.	C.L.[2]	Vol.	C.L.	Vol.	C.L.	Vol.	C.L.	Vol.	C.L.
Green spruce	71.2	±4.1	54.4	±3.1	54.4	±3.1	112.4	±6.7	44.4	±2.5
Current attacks (1982)	3.5	±1.2	2.7	±0.6	2.7	±0.6	5.5	±1.4	2.2	±0.6
Previous attacks (1981)	4.3	±1.2	3.3	±1.0	3.3	±1.0	6.7	±1.8	2.7	±0.8
Old attacks	16.6	±2.4	12.7	±1.8	12.7	±1.8	26.2	±3.5	10.3	±1.4
Partial attacks	3.0	±1.0	2.3	±0.8	2.3	±0.8	4.7	±1.6	1.7	±0.6
Total attack spruce	27.3	±3.1	20.8	±2.4	20.8	±2.4	43.1	±5.1	17.0	±1.9

[1] Volume estimates are based on the weighted average board foot per acre estimate for all strata. Compartment size is a gross estimate with no exclusions for roads, clearcuts, etc.

[2] Confidence limits at the 95-percent level. Confidence limits were derived from the basal area standard error estimates.

FOREST INSECT AND DISEASE

SURVEY SUMMARY
01/10/83

TABLE 6

POPULATION STAND TABLE
STRATA: LOW
HOST SPECIES IS ENGL SPRUCE

THE PEST IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE

THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 162 PLOTS, AND REPRESENT AN AREA OF 9965. ACRES.

BAF WAS 30.

THIS TABLE ONLY INCLUDES HOST TREES

SQ. FT. OF BASAL AREA PER ACRE

DBH	GREEN SP	CURR. 82	PREV. 81	OLD HIT	PART.HIT		TTL AK	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	1.111	.000	.000	.185	.000	.000	.185	14.286	1.296	.951
6.0- 6.9	4.074	.000	.000	.185	.000	.000	.185	4.348	4.259	3.125
7.0- 7.9	4.630	.000	.000	.185	.000	.000	.185	3.846	4.815	3.533
8.0- 8.9	4.259	.000	.000	.556	.000	.000	.556	11.538	4.815	3.533
9.0- 9.9	4.815	.000	.000	.741	.000	.000	.741	13.333	5.556	4.076
10.0- 10.9	4.444	.000	.000	.370	.000	.000	.370	7.692	4.815	3.533
11.0- 11.9	5.185	.000	.000	.000	.000	.000	.000	.000	5.185	3.804
12.0- 12.9	6.667	.185	.185	.926	.000	.000	1.296	16.279	7.963	5.842
13.0- 13.9	9.259	.556	.000	1.296	.000	.000	1.852	16.667	11.111	8.152
14.0- 14.9	8.889	.370	.000	.370	.185	.000	.926	9.434	9.815	7.201
15.0- 15.9	8.148	.185	.000	.741	.185	.000	1.111	12.000	9.259	6.793
16.0- 16.9	7.593	.000	.000	.185	.000	.000	.185	2.381	7.778	5.707
17.0- 17.9	5.000	.185	.000	.926	.556	.000	1.667	25.000	6.667	4.891
18.0- 18.9	6.852	.370	.000	.741	.000	.000	1.111	13.953	7.963	5.842
19.0- 19.9	5.741	.185	.185	1.111	.185	.000	1.667	22.500	7.407	5.435
20.0- 20.9	4.444	.000	.185	1.296	.000	.000	1.481	25.000	5.926	4.348
21.0- 21.9	3.333	.000	.185	.926	.000	.000	1.111	25.000	4.444	3.261
22.0- 22.9	3.333	.185	.000	.556	.000	.000	.741	18.182	4.074	2.989
23.0- 23.9	2.963	.000	.185	.926	.185	.000	1.296	30.435	4.259	3.125
24.0- 24.9	2.222	.185	.000	.741	.000	.000	.926	29.412	3.148	2.310
25.0- 25.9	3.333	.000	.185	.556	.185	.000	.926	21.739	4.259	3.125
26.0- 26.9	2.037	.000	.185	.370	.000	.000	.556	21.429	2.593	1.902
27.0- 27.9	.926	.000	.185	.926	.000	.000	1.111	54.545	2.037	1.495
28.0- 28.9	.741	.185	.000	.741	.000	.000	.926	55.556	1.667	1.223
29.0- 29.9	.556	.185	.185	.556	.000	.000	.926	62.500	1.481	1.087
30.0- 30.9	.370	.000	.185	.370	.000	.000	.556	60.000	.926	.679
31.0- 31.9	.370	.000	.000	.000	.000	.000	.000	.000	.370	.272
32.0- 32.9	.556	.000	.000	.185	.000	.000	.185	25.000	.741	.543
33.0- 33.9	.370	.000	.185	.185	.000	.000	.370	50.000	.741	.543
34.0- 34.9	.185	.000	.000	.185	.000	.000	.185	50.000	.370	.272
35.0- 35.9	.185	.000	.000	.000	.000	.000	.000	.000	.185	.136
38.0- 38.9	.000	.000	.000	.185	.000	.000	.185	100.000	.185	.136
43.0- 43.9	.000	.000	.185	.000	.000	.000	.185	100.000	.185	.136
TOTAL	112.59	2.78	2.22	17.22	1.48	.00	23.70	17.39	136.30	100.00
PERCENT	82.61	2.04	1.63	12.64	1.09	.00	17.39			

FOREST INSECT AND DISEASE

SURVEY SUMMARY
01/10/83

TABLE 7

POPULATION STAND TABLE
STRATA: LOW
HOST SPECIES IS ENGL SPRUCE — THE PEST IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE — THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 162 PLOTS, AND REPRESENT AN AREA OF 9965. ACRES.

BAF WAS 30.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES PER ACRE

DBH	GREEN SP	CURR. 82	PREV. 81	OLD HIT	PART.HIT		TTL AK	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	8.149	.000	.000	1.358	.000	.000	1.358	14.286	9.507	5.881
6.0- 6.9	20.749	.000	.000	.943	.000	.000	.943	4.348	21.692	13.418
7.0- 7.9	17.323	.000	.000	.693	.000	.000	.693	3.846	18.016	11.144
8.0- 8.9	12.202	.000	.000	1.592	.000	.000	1.592	11.538	13.793	8.532
9.0- 9.9	10.899	.000	.000	1.677	.000	.000	1.677	13.333	12.575	7.779
10.0- 10.9	8.149	.000	.000	.679	.000	.000	.679	7.692	8.828	5.461
11.0- 11.9	7.857	.000	.000	.000	.000	.000	.000	.000	7.857	4.860
12.0- 12.9	8.488	.236	.236	1.179	.000	.000	1.650	16.279	10.139	6.271
13.0- 13.9	10.045	.603	.000	1.406	.000	.000	2.009	16.667	12.054	7.456
14.0- 14.9	8.315	.346	.000	.346	.173	.000	.866	9.434	9.181	5.679
15.0- 15.9	6.640	.151	.000	.604	.151	.000	.905	12.000	7.545	4.667
16.0- 16.9	5.438	.000	.000	.133	.000	.000	.133	2.381	5.570	3.446
17.0- 17.9	3.172	.117	.000	.587	.352	.000	1.057	25.000	4.229	2.616
18.0- 18.9	3.877	.210	.000	.419	.000	.000	.629	13.953	4.506	2.787
19.0- 19.9	2.916	.094	.094	.564	.094	.000	.846	22.500	3.762	2.327
20.0- 20.9	2.037	.000	.085	.594	.000	.000	.679	25.000	2.716	1.680
21.0- 21.9	1.386	.000	.077	.385	.000	.000	.462	25.000	1.848	1.143
22.0- 22.9	1.263	.070	.000	.210	.000	.000	.281	18.182	1.543	.955
23.0- 23.9	1.027	.000	.064	.321	.064	.000	.449	30.435	1.476	.913
24.0- 24.9	.707	.059	.000	.236	.000	.000	.295	29.412	1.002	.620
25.0- 25.9	.978	.000	.054	.163	.054	.000	.272	21.739	1.249	.773
26.0- 26.9	.552	.000	.050	.100	.000	.000	.151	21.429	.703	.435
27.0- 27.9	.233	.000	.047	.233	.000	.000	.279	54.545	.512	.317
28.0- 28.9	.173	.043	.000	.173	.000	.000	.217	55.556	.390	.241
29.0- 29.9	.121	.040	.040	.121	.000	.000	.202	62.500	.323	.200
30.0- 30.9	.075	.000	.038	.075	.000	.000	.113	60.000	.189	.117
31.0- 31.9	.071	.000	.000	.000	.000	.000	.000	.000	.071	.044
32.0- 32.9	.099	.000	.000	.033	.000	.000	.033	25.000	.133	.082
33.0- 33.9	.062	.000	.031	.031	.000	.000	.062	50.000	.125	.077
34.0- 34.9	.029	.000	.000	.029	.000	.000	.029	50.000	.059	.036
35.0- 35.9	.028	.000	.000	.000	.000	.000	.000	.000	.028	.017
38.0- 38.9	.000	.000	.000	.024	.000	.000	.024	100.000	.024	.015
43.0- 43.9	.000	.000	.018	.000	.000	.000	.018	100.000	.018	.011
TOTAL	143.06	1.97	.83	14.91	.89	.00	18.60	11.51	161.66	100.00
PERCENT	88.49	1.22	.52	9.22	.55	.00	11.51			

FOREST INSECT AND DISEASE

SURVEY SUMMARY
01/10/83

TABLE 8

POPULATION STAND TABLE
STRATA1 LOW
HOST SPECIES IS ENGL SPRUCE

THE PEST IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE

THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 162 PLOTS. AND

REPRESENT AN AREA OF 9965. ACRES.

BAF WAS 30.

THIS TABLE ONLY INCLUDES NON-HOST TREES

SQ. FT. OF BASAL AREA

PER ACRE

DBH	CORK FIR	DOUG-FIR	PINE/FIR	ASPEN	OTHER	TOTAL	PERCENTILE
5.0- 5.9	.556	.000	.000	.556	.000	1.111	1.987
6.0- 6.9	1.111	.556	.000	.741	.000	2.407	4.305
7.0- 7.9	1.852	.926	.000	.370	.000	3.148	5.629
8.0- 8.9	3.148	.185	.000	1.111	.000	4.444	7.947
9.0- 9.9	1.852	.741	.000	.741	.000	3.333	5.960
10.0- 10.9	1.296	.000	.000	.370	.000	1.667	2.980
11.0- 11.9	1.481	.185	.000	.185	.000	1.852	3.311
12.0- 12.9	1.111	1.111	.000	.185	.000	2.407	4.305
13.0- 13.9	.741	1.667	.185	.556	.000	3.148	5.629
14.0- 14.9	.926	.370	.000	.741	.000	2.037	3.642
15.0- 15.9	.926	1.296	.000	.370	.000	2.593	4.636
16.0- 16.9	1.111	2.037	.000	.926	.000	4.074	7.285
17.0- 17.9	1.296	.556	.185	.741	.000	2.778	4.967
18.0- 18.9	.556	.926	.000	.370	.000	1.852	3.311
19.0- 19.9	.926	1.481	.000	.370	.000	2.778	4.967
20.0- 20.9	.926	1.111	.000	.370	.000	2.407	4.305
21.0- 21.9	.185	.741	.185	.000	.000	1.111	1.987
22.0- 22.9	.370	.926	.000	.185	.000	1.481	2.649
23.0- 23.9	.000	.185	.000	.185	.000	.370	.662
24.0- 24.9	.000	1.111	.000	.000	.000	1.111	1.987
25.0- 25.9	.370	1.481	.000	.000	.000	1.852	3.311
26.0- 26.9	.000	.556	.000	.000	.000	.556	.993
27.0- 27.9	.185	.741	.000	.000	.000	.926	1.656
28.0- 28.9	.000	.370	.000	.000	.000	.370	.662
29.0- 29.9	.185	.556	.000	.000	.000	.741	1.325
30.0- 30.9	.000	.370	.000	.000	.000	.370	.662
31.0- 31.9	.185	.370	.000	.000	.000	.556	.993
32.0- 32.9	.000	.556	.000	.000	.000	.556	.993
33.0- 33.9	.000	.741	.000	.000	.000	.741	1.325
34.0- 34.9	.000	1.111	.000	.000	.000	1.111	1.987
35.0- 35.9	.000	.370	.000	.000	.000	.370	.662
36.0- 36.9	.000	.370	.000	.000	.000	.370	.662
37.0- 37.9	.000	.741	.000	.000	.000	.741	1.325
38.0- 38.9	.000	.185	.000	.000	.000	.185	.331
39.0- 39.9	.000	.370	.000	.000	.000	.370	.662
TOTAL	21.30	25.00	.56	9.07	.00	55.93	100.00
PERCENT	38.08	44.70	.99	16.23	.00	.00	

FOREST INSECT AND DISEASE

SURVEY SUMMARY
11/13/83

TABLE 9
POPULATION STAND TABLE
STRATA: LOW
HOST SPECIES IS ENGL SPRUCE

THE PEST IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 162 PLOTS. AND

REPRESENT AN AREA OF 9965.ACRES.

BAF WAS 30.

THIS TABLE ONLY INCLUDES NON-HOST TREES

NUMBERS OF TREES

PER ACRE

DBH	CORK FIR	DOUG-FIR	PINE/FIR	ASPEN	OTHER	TOTAL	PERCENTILE
5.0- 5.9	4.074	.000	.000	4.074	.000	8.149	10.109
6.0- 6.9	5.659	2.829	.000	3.773	.000	12.261	15.211
7.0- 7.9	6.929	3.465	.000	1.386	.000	11.780	14.614
8.0- 8.9	9.519	.531	.000	3.183	.000	12.732	15.796
9.0- 9.9	4.142	1.571	.000	1.571	.000	7.285	9.040
10.0- 10.9	2.377	.000	.000	.679	.000	3.056	3.791
11.0- 11.9	2.245	.281	.000	.281	.000	2.806	3.481
12.0- 12.9	1.415	1.415	.000	.236	.000	3.065	3.803
13.0- 13.9	.809	1.416	.271	.809	.000	3.415	4.237
14.0- 14.9	.866	.346	.000	.693	.000	1.906	2.364
15.0- 15.9	.755	1.056	.000	.302	.000	2.113	2.621
16.0- 16.9	.796	1.459	.000	.663	.000	2.918	3.620
17.0- 17.9	.822	.352	.117	.470	.000	1.762	2.186
18.0- 18.9	.314	.524	.000	.210	.000	1.048	1.300
19.0- 19.9	.470	.752	.000	.188	.000	1.411	1.750
20.0- 20.9	.424	.509	.000	.170	.000	1.103	1.369
21.0- 21.9	.077	.308	.077	.000	.000	.462	.573
22.0- 22.9	.140	.351	.000	.070	.000	.561	.696
23.0- 23.9	.000	.064	.000	.064	.000	.128	.159
24.0- 24.9	.000	.354	.000	.000	.000	.354	.439
25.0- 25.9	.149	.435	.000	.000	.000	.543	.674
26.0- 26.9	.000	.151	.000	.000	.000	.151	.187
27.0- 27.9	.047	.186	.000	.000	.000	.233	.289
28.0- 28.9	.000	.087	.000	.000	.000	.087	.107
29.0- 29.9	.040	.121	.000	.000	.000	.161	.200
30.0- 30.9	.000	.075	.000	.000	.000	.075	.094
31.0- 31.9	.035	.071	.000	.000	.000	.106	.131
32.0- 32.9	.000	.099	.000	.000	.000	.099	.123
33.0- 33.9	.000	.125	.000	.000	.000	.125	.155
34.0- 34.9	.000	.176	.000	.000	.000	.176	.219
35.0- 35.9	.000	.055	.000	.000	.000	.055	.069
36.0- 36.9	.000	.052	.000	.000	.000	.052	.065
37.0- 37.9	.000	.099	.000	.000	.000	.099	.123
38.0- 38.9	.000	.024	.000	.000	.000	.024	.029
39.0- 39.9	.000	.045	.000	.000	.000	.045	.055
TOTAL	41.851	19.898	.405	18.728	.000	80.881	100.000
PERCENT	51.62	24.67	.49	23.22	.00	.00	

FOREST INSECT AND DISEASE

TABLE 10

SURVEY SUMMARY
01/07/83

POPULATION STAND TABLE
STRATA2 MODERATE
HOST SPECIES IS ENGL SPRUCE — THE PEST IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE. THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 350 PLOTS. AND REPRESENT AN AREA OF 3756.ACRES.

BAF WAS 30.

THIS TABLE ONLY INCLUDES HOST TREES

SQ. FT. OF BASAL AREA PER ACRE

DBH	GREEN SP	CURR. 82	PREV. 81	OLD HIT	PART.HIT		TTL AK	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	1.371	.000	.000	.000	.000	.000	.000	.000	1.371	.000
6.0- 6.9	3.086	.000	.000	.171	.000	.000	.171	5.263	3.257	1.000
7.0- 7.9	5.314	.000	.000	.257	.000	.000	.257	4.615	5.571	3.265
8.0- 8.9	6.429	.086	.000	.257	.000	.000	.343	5.063	6.771	3.968
9.0- 9.9	8.486	.086	.000	.000	.000	.000	.086	1.000	8.571	5.123
10.0- 10.9	8.486	.000	.086	.000	.000	.000	.086	7.477	8.171	5.374
11.0- 11.9	7.457	.257	.000	.514	.086	.000	.257	1.538	8.314	4.872
12.0- 12.9	7.457	.257	.000	.514	.086	.000	.257	1.538	8.314	4.872
13.0- 13.9	7.800	.086	.257	.000	.000	.000	.343	10.784	8.743	5.123
14.0- 14.9	9.771	.343	.000	.000	.514	.000	1.029	13.636	11.314	6.630
15.0- 15.9	9.000	.257	.257	.086	.171	.000	1.371	17.222	1.371	5.077
16.0- 16.9	7.886	.257	.257	.943	.686	.000	2.143	21.344	1.029	5.876
17.0- 17.9	9.171	.429	.171	.000	.429	.000	1.029	15.273	1.200	6.329
18.0- 18.9	6.171	.514	.514	1.200	.257	.000	2.486	28.713	8.657	5.073
19.0- 19.9	7.200	.343	.429	1.200	.257	.000	2.229	23.654	9.429	5.635
20.0- 20.9	6.086	.086	.514	1.371	.257	.000	2.229	26.846	8.314	4.872
21.0- 21.9	5.143	.257	.000	.943	.086	.000	1.286	20.000	7.429	4.119
22.0- 22.9	3.686	.343	.514	.000	.171	.000	1.714	31.746	5.400	3.164
23.0- 23.9	3.171	.600	.429	.943	.343	.000	2.314	42.162	5.486	3.214
24.0- 24.9	2.571	.686	.514	1.371	.171	.000	2.743	51.613	5.314	3.114
25.0- 25.9	3.000	.086	.514	.771	.086	.000	1.457	32.692	4.457	2.612
26.0- 26.9	1.971	.086	.343	.514	.086	.000	1.029	34.286	2.971	1.756
27.0- 27.9	1.114	.086	.343	.943	.086	.000	1.457	56.667	2.571	1.507
28.0- 28.9	1.371	.000	.171	.514	.429	.000	1.114	44.828	2.486	1.457
29.0- 29.9	1.029	.086	.171	.171	.086	.000	.514	33.333	1.543	.904
30.0- 30.9	.600	.086	.257	.343	.000	.000	.686	53.333	1.286	.754
31.0- 31.9	.771	.000	.000	.429	.171	.000	.600	43.7	1.371	.804
32.0- 32.9	.257	.000	.000	.086	.000	.000	.086	25.000	.343	.201
33.0- 33.9	.257	.000	.000	.000	.000	.000	.086	25.000	.343	.201
34.0- 34.9	.343	.000	.000	.171	.000	.000	.171	33.333	.514	.301
35.0- 35.9	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
36.0- 36.9	.086	.000	.086	.000	.000	.000	.086	100.000	.171	.100
41.0- 41.9	.000	.000	.086	.000	.000	.000	.086	100.000	.086	.050
42.0- 42.9	.086	.000	.000	.000	.000	.000	.000	.000	.086	.050
46.0- 46.9	.086	.000	.000	.000	.000	.000	.000	.000	.086	.050
TOTAL	136.71	5.31	6.51	17.37	4.54	.00	33.74	19.89	17.060	100.00
PERCENT	80.11	3.11	3.82	10.37	2.66	.00	19.99			

FOREST INSECT AND DISEASE

TABLE 11

SURVEY SUMMARY
81/ 7/83

POPULATION STAND TABLE
STRATA2 MODERATE
HOST SPECIES IS ENGL SPRUCE — THE PEST IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE — THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 35 PLOTS, AND REPRESENT AN AREA OF 3756. ACRES.

BAF WAS 30.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES PER ACRE

DBH	GREEN SP	CURR. 82	PREV. 81	GLC HIT	PARI.HIT		TTL AK	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	10.458	.002	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]	5.145
6.0- 6.9	13.713	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
7.0- 7.9	19.886	.[illegible]	.[illegible]	.926	.[illegible]	.[illegible]	.[illegible]	.[illegible]	2.[illegible]	1.671
8.0- 8.9	18.417	.246	.[illegible]	.727	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]	9.529
9.0- 9.9	19.274	.134	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.0	1.[illegible]	5.736
10.0- 10.[illegible]	15.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]	.[illegible]	.[illegible]	.[illegible]
11.0- 11.9	11.202	.[illegible]	.[illegible]	.778	.[illegible]	.[illegible]	1.[illegible]	1.[illegible]	1.[illegible]	1.448
12.0- 12.9	7.495	.327	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]	1.[illegible]	1.[illegible]	5.418
13.0- 13.9	8.462	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]	.[illegible]	.[illegible]	.[illegible]
14.0- 14.9	9.141	.321	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]	.[illegible]	1.[illegible]	5.417
15.0- 15.9	7.334	.[illegible]	.[illegible]	.[illegible]	.14	.[illegible]	1.[illegible]	.[illegible]	.[illegible]	4.726
16.0- 16.9	5.648	.1[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]	21.[illegible]	7.[illegible]	3.[illegible]
17.0- 17.9	5.812	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]	.[illegible]	.[illegible]	.[illegible]
18.0- 18.9	3.492	.[illegible]	.[illegible]	.[illegible]	.14[illegible]	.[illegible]	1.[illegible]	.[illegible]	.[illegible]	.[illegible]
19.0- 19.9	3.657	.174	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]	.[illegible]	.[illegible]	2.451
20.0- 20.[illegible]	2.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]	.[illegible]	.[illegible]	1.[illegible]
21.0- 21.9	2.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
22.0- 22.9	1.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
23.0- 23.9	1.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
24.0- 24.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
25.0- 25.9	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
26.0- 26.9	.535	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
27.0- 27.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
28.0- 28.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
29.0- 29.[illegible]	.224	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
30.0- 30.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
31.0- 31.[illegible]	.147	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
32.0- 32.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
33.0- 33.9	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
34.0- 34.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
35.0- 35.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
36.0- 36.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
41.0- 41.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
42.0- 42.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
46.0- 46.[illegible]	.007	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]
TOTAL	174.11	[illegible].91	2.[illegible]	12.[illegible]	2.[illegible]	.[illegible]	21.27	10.[illegible]	125.[illegible]	10[illegible].[illegible]
PERCENT	80.11	1.[illegible]	1.[illegible]	.[illegible]	1.[illegible]	.[illegible]	[illegible].83			

FOREST INSECT AND DISEASE

TABLE 12

SURVEY SUMMARY
'17 1981

POPULATION STAND TABLE
STRATA2 MODERATE
HOST SPECIES IS ENGL SPRUCE — THE REST IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE. THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 351 PLOTS, AND REPRESENT AN AREA OF 475,ACRES.

BAF WAS 30.

THIS TABLE ONLY INCLUDES NON-HOST TREES

SQ. FT. OF BASAL AREA
PER ACRE

DBH	CORK FIR	DOUG FIR	PINE/FIR	ASPEN	[illegible]	TOTAL	SPRUCE BTL
5.0- 5.9	.514	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
6.0- 6.9	.943	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.943	4.[illegible]
7.0- 7.9	1.029	.[illegible]	.[illegible]	.257	.[illegible]	1.771	[illegible]
8.0- 8.9	.514	.171	.[illegible]	.343	.[illegible]	1.[illegible]	4.[illegible]
9.0- 9.9	1.371	.171	.[illegible]	.343	.[illegible]	2.[illegible]	[illegible]
10.0- 10.9	1.200	.171	.[illegible]	.857	.[illegible]	[illegible]	1.[illegible]
11.0- 11.9	1.200	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
12.0- 12.9	.686	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]	[illegible]
13.0- 13.9	.343	.257	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
14.0- 14.9	.257	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.771	[illegible]
15.0- 15.9	.429	.[illegible]	.[illegible]	.171	.[illegible]	1.[illegible]	[illegible]
16.0- 16.9	.514	.171	.[illegible]	.[illegible]	.[illegible]	.771	[illegible]
17.0- 17.9	.257	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]
18.0- 18.9	.085	.257	.[illegible]	.[illegible]	.[illegible]	.942	1.[illegible]
19.0- 19.9	.343	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
20.0- 20.9	.600	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]	4.[illegible]
21.0- 21.9	.257	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
22.0- 22.9	.343	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
23.0- 23.9	.171	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
24.0- 24.9	.171	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
25.0- 25.9	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]
26.0- 26.9	.[illegible]	.257	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]
27.0- 27.9	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
29.0- 29.9	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
31.0- 31.9	.[illegible]	.257	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]
32.0- 32.9	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1.[illegible]
33.0- 33.9	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
34.0- 34.9	.[illegible]	.171	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
35.0- 35.9	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	[illegible]
38.0- 38.9	.[illegible]	.171	.[illegible]	.[illegible]	.[illegible]	.171	.[illegible]
TOTAL	11.23	[illegible]	[illegible]	4.[illegible]	[illegible]	[illegible]	1.[illegible]
PERCENT	52.8[illegible]	21.27	[illegible]	16.[illegible]	[illegible]	[illegible]	[illegible]

TABLE 13

THE PEST IS SPRUCE BEETLE

THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 350 PLOTS, AND

REPRESENT AN AREA OF 7756. ACRES.

THIS TABLE ONLY INCLUDES NON-HOST TREES

NUMBERS OF TREES

PER ACRE

DBH	DOUG FIR	PINE/FIR	ASPEN	OTHER	TOTAL	PERCENTILE
6.0 - 6.9	1.774	.826	.[illegible]	.[illegible]	4.[illegible]	12.37
7.0 - 7.9	4.8[illegible]	.[illegible]	.[illegible]	.[illegible]	4.[illegible]	13.[illegible]
[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	13.[illegible]
8.0 - 8.9	1.473	.431	.[illegible]	.[illegible]	2.[illegible]47	9.[illegible]1
9.0 - 9.9	3.104	.268	.[illegible]	.776	4.[illegible]	11.754
10.0 - 10.9	2.2[illegible]	.714	.[illegible]	2.577	4.[illegible]	11.[illegible]33
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12.0 - 12.9	.472	.[illegible]3	.[illegible]	1.[illegible]41	.[illegible]	2.74	5.[illegible]1
13.0 - 13.9	.[illegible]72	.[illegible]79	.[illegible]	.[illegible]	.[illegible]	.851	1.[illegible]3
14.0 - 14.9	.[illegible]241	.[illegible]1	.[illegible]	.[illegible]	.[illegible]	.733	1.[illegible]4
15.0 - 15.9	.[illegible]54	.[illegible]45	.[illegible]	.[illegible]	.[illegible]	.[illegible]49	[illegible].[illegible]4
16.0 - 16.9	.[illegible]5[illegible]	.[illegible]3[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]93	1.[illegible]19
17.0 - 17.9	.[illegible]03	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]03	.[illegible]443
18.0 - 18.9	.[illegible]4[illegible]	.[illegible]1[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]34	.[illegible]55
19.0 - 19.9	.[illegible]17[illegible]	.[illegible]31	.[illegible]	.[illegible]	.[illegible]	.[illegible]45[illegible]	1.[illegible]07
20.0 - 20.9	.[illegible]27[illegible]	.[illegible]14[illegible]	.[illegible]	.[illegible]	.[illegible]	.471	1.[illegible]
21.0 - 21.9	.[illegible]1[illegible]7	.[illegible]14[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]5[illegible]	.[illegible]44
22.0 - 22.9	.[illegible]1[illegible]	.[illegible]47	.[illegible]	.[illegible]	.[illegible]	.[illegible]37	.[illegible]56
23.0 - 23.9	.[illegible]0[illegible]	.[illegible]14[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]2[illegible]	.[illegible]72
24.0 - 24.9	.[illegible]	.[illegible]1[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]64	.[illegible]2[illegible]
25.0 - 25.9	.[illegible]	.[illegible]1[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]1[illegible]	.[illegible]77
26.0 - 26.9	.[illegible]	.[illegible]1[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]7[illegible]	.[illegible]12
27.0 - 27.9	.[illegible]	.[illegible]1[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]1[illegible]	.[illegible]15
28.0 - 28.9	.[illegible]	.[illegible]1	.[illegible]	.[illegible]	.[illegible]	.[illegible]1[illegible]	.[illegible]51
29.0 - 29.9	.[illegible]	.[illegible]07	.[illegible]	.[illegible]	.[illegible]	.[illegible]2[illegible]	.[illegible]44
30.0 - 30.9	.[illegible]	.[illegible]31	.[illegible]	.[illegible]	.[illegible]	.[illegible]31	.[illegible]1[illegible]
31.0 - 31.9	.[illegible]	.[illegible]14	.[illegible]	.[illegible]	.[illegible]	.[illegible]14	.[illegible]2[illegible]
32.0 - 32.9	.[illegible]	.[illegible]27	.[illegible]	.[illegible]	.[illegible]	.[illegible]27	.[illegible]75
33.0 - 33.9	.[illegible]	.[illegible]1[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]1[illegible]	.[illegible]32
34.0 - 34.9	.[illegible]	.[illegible]1[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

FOREST INSECT AND DISEASE

SURVEY SUMMARY
01/10/83

TABLE 14

POPULATION STAND TABLE
STRATA3
HOST SPECIES IS ENGL SPRUCE — THE PEST IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 245 PLOTS. AND

REPRESENT AN AREA OF 9483.ACRES.

BAF WAS 30.

THIS TABLE ONLY INCLUDES HOST TREES

SQ. FT. OF BASAL AREA

PER ACRE

DBH	GREEN SP	CURR. 82	PREV. 81	OLD HIT	PART.HIT		TTL AK	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	1.102	.000	.000	.122	.000	.000	.122	10.000	1.224	1.040
6.0- 6.9	1.224	.000	.000	.000	.000	.000	.000	.000	1.224	1.040
7.0- 7.9	2.082	.000	.000	.122	.000	.000	.122	5.556	2.204	1.871
8.0- 8.9	2.694	.000	.000	.122	.000	.000	.122	4.348	2.816	2.391
9.0- 9.9	3.673	.000	.000	.122	.000	.000	.122	3.226	3.796	3.222
10.0- 10.9	3.919	.000	.000	.245	.122	.000	.367	8.571	4.286	3.638
11.0- 11.9	3.918	.000	.000	.245	.000	.000	.245	5.882	4.163	3.534
12.0- 12.9	4.653	.367	.122	.612	.245	.000	1.347	22.449	6.000	5.094
13.0- 13.9	4.898	.367	.122	.490	.245	.000	1.224	20.000	6.122	5.198
14.0- 14.9	5.633	.122	.122	.857	.122	.000	1.224	17.857	6.857	5.821
15.0- 15.9	5.265	.000	.367	.735	.245	.000	1.347	20.370	6.612	5.613
16.0- 16.9	5.265	.367	.122	.857	.122	.000	1.469	21.818	6.735	5.717
17.0- 17.9	5.796	.490	.122	.735	.367	.000	1.714	31.111	5.510	4.678
18.0- 18.9	3.796	.245	.245	.980	.122	.000	1.592	29.545	5.388	4.574
19.0- 19.9	5.755	.490	.000	1.224	.367	.000	2.082	26.563	7.837	6.653
20.0- 20.9	4.776	.612	.245	1.959	.612	.000	3.429	41.791	8.204	6.965
21.0- 21.9	3.673	.245	.490	1.469	.490	.000	2.694	42.308	6.367	5.405
22.0- 22.9	3.184	.367	.367	1.347	.122	.000	2.204	40.909	5.388	4.574
23.0- 23.9	2.939	.367	.490	1.837	.367	.000	3.061	51.020	6.000	5.094
24.0- 24.9	2.327	.490	.245	1.224	.000	.000	1.959	45.714	4.286	3.638
25.0- 25.9	1.592	.000	.245	.857	.367	.000	1.469	48.000	3.061	2.599
26.0- 26.9	1.592	.122	.490	1.102	.245	.000	1.959	55.172	3.551	3.015
27.0- 27.9	1.592	.000	.367	.122	.000	.000	.490	23.529	2.082	1.767
28.0- 28.9	.980	.000	.245	.735	.000	.000	.980	50.000	1.959	1.663
29.0- 29.9	.367	.000	.000	.612	.122	.000	.735	66.667	1.102	.936
30.0- 30.9	.612	.000	.122	.490	.122	.000	.735	54.545	1.347	1.143
31.0- 31.9	.245	.000	.245	.122	.122	.000	.490	66.667	.735	.624
32.0- 32.9	.245	.000	.367	.490	.000	.000	.857	77.778	1.102	.936
33.0- 33.9	.245	.000	.245	.245	.000	.000	.490	66.667	.735	.624
34.0- 34.9	.367	.000	.000	.122	.000	.000	.122	25.000	.490	.416
35.0- 35.9	.000	.000	.000	.122	.122	.000	.245	100.000	.245	.208
36.0- 36.9	.245	.000	.000	.000	.000	.000	.000	.000	.245	.208
40.0- 40.9	.000	.000	.000	.122	.000	.000	.122	100.000	.122	.104
TOTAL	82.65	4.65	5.39	20.45	4.65	.00	35.14	29.83	117.80	100.00
PERCENT	70.17	3.95	4.57	17.36	3.95	.00	29.83			

FOREST INSECT AND DISEASE

TABLE 15

SURVEY SUMMARY
01/10/83

POPULATION STAND TABLE
STRATA3
HOST SPECIES IS ENGL SPRUCE — THE PEST IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE — THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 245 PLOTS, AND REPRESENT AN AREA OF 9483. ACRES.

BAF WAS 30.

THIS TABLE ONLY INCLUDES HOST TREES

NUMBERS OF TREES PER ACRE

DBH	GREEN SP	CURR. 82	PREV. 81	OLD HIT	PART.HIT		TTL AK	PERCENT	TOTAL	PERCENTILE
5.0- 5.9	8.082	.000	.000	.898	.000	.000	.898	10.000	8.980	8.047
6.0- 6.9	6.236	.000	.000	.000	.000	.000	.000	.000	6.236	5.588
7.0- 7.9	7.789	.000	.000	.458	.000	.000	.458	5.556	8.247	7.390
8.0- 8.9	7.717	.000	.000	.351	.000	.000	.351	4.348	8.068	7.230
9.0- 9.9	8.315	.000	.000	.277	.000	.000	.277	3.226	8.592	7.699
10.0- 10.9	7.184	.000	.000	.449	.225	.000	.674	8.571	7.858	7.041
11.0- 11.9	5.937	.000	.000	.371	.000	.000	.371	5.882	6.308	5.653
12.0- 12.9	5.924	.468	.156	.780	.312	.000	1.715	22.449	7.639	6.846
13.0- 13.9	5.314	.399	.133	.531	.266	.000	1.328	24.000	6.642	5.952
14.0- 14.9	5.269	.115	.115	.802	.115	.000	1.145	17.857	6.414	5.748
15.0- 15.9	4.291	.000	.299	.599	.200	.000	1.098	20.370	5.388	4.828
16.0- 16.9	3.771	.263	.088	.614	.088	.000	1.052	21.818	4.823	4.322
17.0- 17.9	2.408	.311	.078	.466	.233	.000	1.088	31.111	3.496	3.133
18.0- 18.9	2.148	.139	.139	.554	.069	.000	.901	29.545	3.049	2.732
19.0- 19.9	2.923	.249	.000	.622	.187	.000	1.057	26.563	3.980	3.567
20.0- 20.9	2.189	.281	.112	.898	.281	.000	1.572	41.791	3.762	3.370
21.0- 21.9	1.527	.102	.204	.611	.204	.000	1.120	42.308	2.647	2.372
22.0- 22.9	1.206	.139	.139	.513	.046	.000	.835	40.909	2.041	1.829
23.0- 23.9	1.019	.127	.170	.637	.127	.000	1.061	51.020	2.080	1.863
24.0- 24.9	.741	.156	.078	.390	.000	.000	.624	45.714	1.364	1.222
25.0- 25.9	.467	.000	.072	.251	.108	.000	.431	49.000	.898	.805
26.0- 26.9	.432	.033	.133	.299	.066	.000	.531	55.172	.963	.863
27.0- 27.9	.400	.000	.092	.031	.000	.000	.123	23.529	.524	.469
28.0- 28.9	.229	.000	.057	.172	.000	.000	.229	50.000	.459	.411
29.0- 29.9	.080	.000	.000	.133	.027	.000	.160	66.667	.240	.215
30.0- 30.9	.125	.000	.025	.100	.025	.000	.150	54.545	.274	.246
31.0- 31.9	.047	.000	.047	.023	.023	.000	.093	66.667	.140	.126
32.0- 32.9	.044	.000	.066	.088	.000	.000	.153	77.778	.197	.177
33.0- 33.9	.041	.000	.041	.041	.000	.000	.082	66.667	.124	.111
34.0- 34.9	.058	.000	.000	.019	.000	.000	.019	25.000	.078	.070
35.0- 35.9	.000	.000	.000	.018	.018	.000	.037	100.000	.037	.033
36.0- 36.9	.035	.000	.000	.000	.000	.000	.000	.000	.035	.031
40.0- 40.9	.000	.000	.000	.014	.000	.000	.014	100.000	.014	.013
TOTAL	91.95	3.78	2.24	12.41	2.62	.00	19.65	17.61	111.60	100.00
PERCENT	82.39	3.49	2.01	10.76	2.35	.00	17.61			

FOREST INSECT AND DISEASE

SURVEY SUMMARY
01/10/83

TABLE 16

POPULATION STAND TABLE
STRATA?
HOST SPECIES IS ENGL SPRUCE — THE PEST IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE — THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 245 PLOTS. AND REPRESENT AN AREA OF 9483.ACRES.

BAF WAS 30.

THIS TABLE ONLY INCLUDES NON-HOST TREES

SQ. FT. OF BASAL AREA PER ACRE

DBH	CORK FIR	DOUG-FIR	PINE/FIR	ASPEN	OTHER	TOTAL	PERCENTILE
5.0- 5.9	.735	.000	.000	.000	.000	.735	1.493
6.0- 6.9	1.592	.000	.000	.245	.000	1.837	3.731
7.0- 7.9	2.449	.000	.000	.122	.000	2.571	5.224
8.0- 8.9	2.694	.000	.000	.000	.000	2.694	5.473
9.0- 9.9	2.449	.122	.000	.612	.000	3.184	6.468
10.0- 10.9	1.837	.122	.000	.612	.000	2.571	5.224
11.0- 11.9	1.592	.367	.122	.367	.000	2.449	4.975
12.0- 12.9	2.204	.122	.000	.735	.000	3.061	6.219
13.0- 13.9	1.714	.367	.122	.490	.000	2.694	5.473
14.0- 14.9	1.714	.000	.000	.367	.000	2.082	4.229
15.0- 15.9	1.837	.612	.122	.245	.000	2.816	5.721
16.0- 16.9	.857	.612	.000	.612	.000	2.082	4.229
17.0- 17.9	1.102	.612	.122	.612	.000	2.449	4.975
18.0- 18.9	.612	.612	.000	.857	.000	2.082	4.229
19.0- 19.9	1.224	.857	.000	.245	.000	2.327	4.726
20.0- 20.9	.367	.735	.000	.000	.000	1.102	2.239
21.0- 21.9	.735	1.224	.000	.857	.000	2.816	5.721
22.0- 22.9	.490	.735	.245	.245	.000	1.714	3.483
23.0- 23.9	.980	.612	.000	.367	.000	1.959	3.980
24.0- 24.9	.122	.735	.000	.245	.000	1.102	2.239
25.0- 25.9	.367	.735	.000	.000	.000	1.102	2.239
26.0- 26.9	.000	.245	.000	.000	.000	.245	.498
27.0- 27.9	.122	.857	.000	.000	.000	.980	1.990
28.0- 28.9	.122	.612	.000	.000	.000	.735	1.493
29.0- 29.9	.000	.490	.000	.000	.000	.490	.995
30.0- 30.9	.000	.245	.000	.000	.000	.245	.498
31.0- 31.9	.000	.367	.000	.000	.000	.367	.746
32.0- 32.9	.000	.367	.000	.000	.000	.367	.746
36.0- 36.9	.000	.122	.000	.000	.000	.122	.249
37.0- 37.9	.000	.122	.000	.000	.000	.122	.249
39.0- 39.9	.000	.122	.000	.000	.000	.122	.249
TOTAL	27.92	12.73	.73	7.84	.00	49.22	100.00
PERCENT	56.72	25.87	1.49	15.92	.00	.00	

FOREST INSECT AND DISEASE

SURVEY SUMMARY
01/10/83

TABLE 17

POPULATION STAND TABLE
STRATA3
HOST SPECIES IS ENGL SPRUCE — THE PEST IS SPRUCE BEETLE

THE METHOD OF SAMPLING WAS VARIABLE — THE FIGURES IN THIS TABLE ARE BASED ON A SAMPLE OF 245 PLOTS, AND REPRESENT AN AREA OF 3483.ACRES.

BAF WAS 30.

THIS TABLE ONLY INCLUDES NON-HOST TREES

NUMBERS OF TREES PER ACRE

DBH	CORK FIR	DOUG-FIR	PINE/FIR	ASPEN	OTHER	TOTAL	PERCENTILE
5.0- 5.9	5.388	.000	.000	.000	.000	5.388	7.445
6.0- 6.9	8.107	.000	.000	1.247	.000	9.354	13.618
7.0- 7.9	9.164	.000	.000	.458	.000	9.622	14.[illegible]
8.0- 8.9	7.717	.000	.000	.000	.000	7.717	11.236
9.0- 9.9	5.543	.277	.000	1.386	.000	7.206	10.492
10.0- 10.9	3.360	.000	.000	1.123	.000	4.715	6.864
11.0- 11.9	2.412	.000	.180	.567	.000	3.711	5.403
12.0- 12.9	2.806	.156	.000	.935	.000	3.898	5.675
13.0- 13.9	1.862	.399	.133	.531	.000	2.923	4.255
14.0- 14.9	1.624	.000	.000	.344	.000	1.967	2.835
15.0- 15.9	1.497	.499	.100	.200	.000	2.295	3.341
16.0- 16.9	.614	.438	.000	.438	.000	1.491	2.171
17.0- 17.9	.699	.388	.078	.389	.000	1.554	2.262
18.0- 18.9	.346	.346	.000	.485	.000	1.178	1.715
19.0- 19.9	.622	.435	.000	.124	.000	1.182	1.720
20.0- 20.9	.168	.337	.000	.000	.000	.505	.735
21.0- 21.9	.335	.509	.000	.386	.000	1.171	1.705
22.0- 22.9	.194	.278	.093	.093	.000	.649	.945
23.0- 23.9	.340	.212	.000	.127	.000	.679	.949
24.0- 24.9	.339	.234	.000	.078	.000	.351	.511
25.0- 25.9	.174	.216	.000	.133	.000	.523	.471
26.0- 26.9	.000	.166	.000	.000	.000	.166	.197
27.0- 27.9	.031	.216	.000	.000	.000	.246	.359
28.0- 28.9	.029	.143	.000	.000	.000	.172	.250
29.0- 29.9	.000	.107	.000	.000	.000	.107	.155
30.0- 30.9	.000	.050	.000	.000	.000	.050	.073
31.0- 31.9	.000	.079	.000	.000	.000	.079	.102
32.0- 32.9	.000	.166	.000	.000	.000	.166	.196
36.0- 36.9	.000	.017	.000	.000	.000	.017	.025
37.0- 37.9	.000	.016	.000	.000	.000	.016	.024
39.0- 39.9	.000	.015	.000	.000	.000	.015	.021
TOTAL	53.99	6.27	.69	8.97	.69	69.68	100.00
PERCENT	77.10	9.13	.99	12.88	.00	.00	

TABLE 18.--Average diameters for spruce by damage class and stratum, Fort Apache Indian Reservation

Strata	Average d.b.h. (inches)					
	Green	Current attacks (1982)	Previous attacks (1981)	Old attacks	Partial attacks	All
Stratum 1 low	15.5	17.9	25.7	19.4	18.4	16.8
Stratum 2 mod.	15.4	19.9	19.9	20.2	20.2	17.0
Stratum 3 high	16.6	18.8	23.4	21.1	20.3	18.6
Weighted average	15.9	18.4	24.2	20.2	19.4	17.7